



Alternative 20 - Summary

Improve Delta Flow Through Added Storage

Emphasis

Increase the availability, reliability, and water quality of supplies for the ecosystem and diverters, primarily through new storage and operational changes to the water system. Physical modifications within the Delta are limited to habitat improvements, levee and channel improvements for flood control, and flow barriers to improve south Delta water levels and flow circulation.

Distinguishing Features

This alternative is intended to provide a **moderate** level of resource improvement and conflict resolution.

Physical/Structural	Operational/Management	Institutional/Policy
<ul style="list-style-type: none"> • New reservoir storage to increase supply reliability, water quality and environmental releases • Downstream channel capacities improvements to reduce reservoir flood control capacity requirements • Tide gates or flow barriers in southern Delta to improve water levels and circulation • Moderate level of levee improvement • Moderate level of habitat restoration in the Bay, the Delta, and in the Sacramento and San Joaquin Rivers • New screens on high and moderate priority diversions • New screened intake at Italian Slough 	<ul style="list-style-type: none"> • Manage reservoirs to improve water quality and increase water availability • Real-time monitoring to dilute pollutants and repel salinity • Water conservation, reclamation, acquisition, and desalination to increase stream flows • Pollutant source controls and enforcement for agricultural drainage, establish water quality BMPs, pest control, and remediate on-site mine drainage • Obtain 100,000 AF on San Joaquin River and manage for environmental purposes 	<ul style="list-style-type: none"> • Institutional mechanisms to implement water transfers • Funded levee improvements, emergency management plan, and landside buffer zones to reduce system vulnerability

Benefits

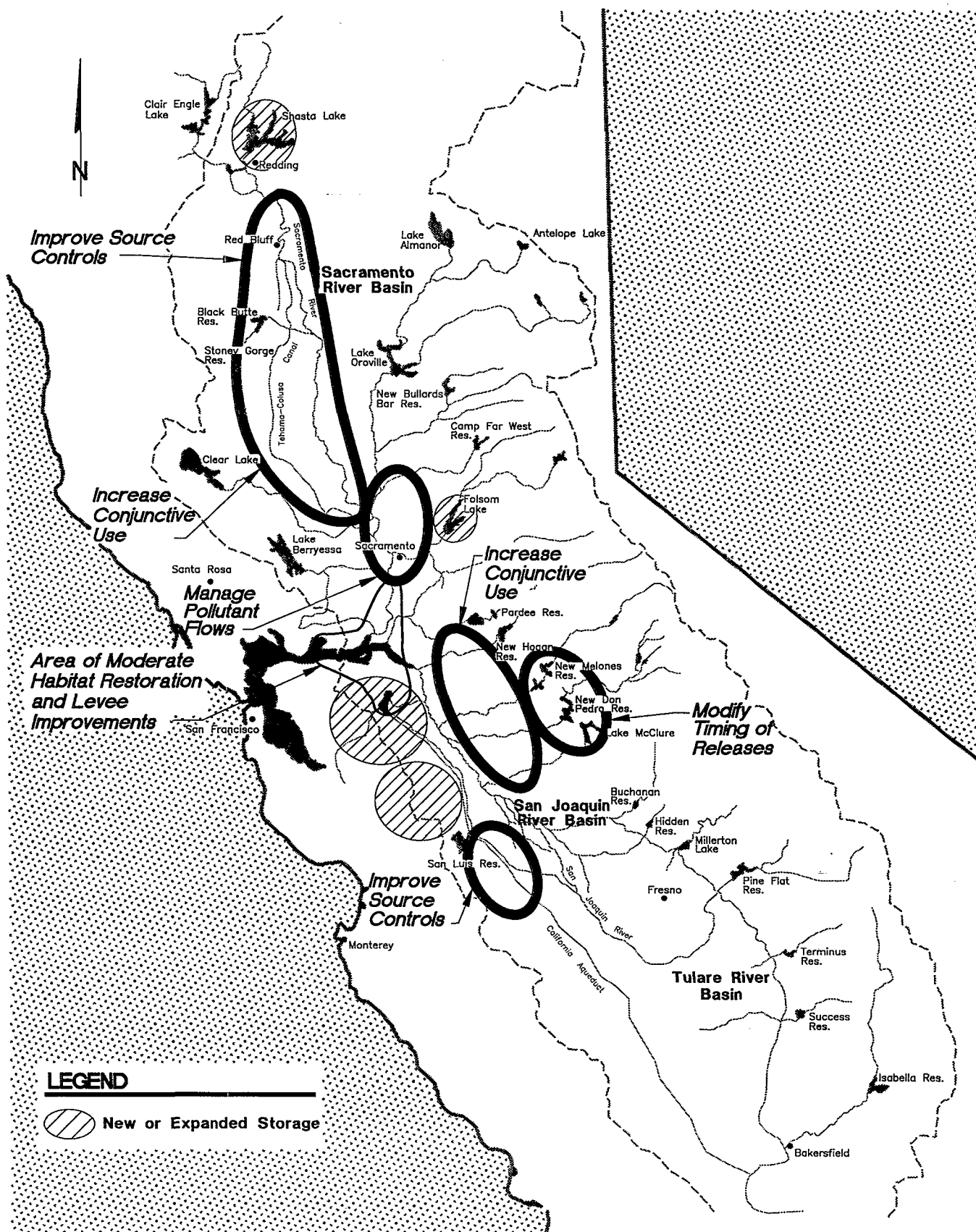
- Improves ecosystem quality through habitat restoration and increased flows
- Increases water availability for all users of Delta water
- Funded levee management program decreases vulnerability of Delta functions
- Improves Delta water quality through pollutant source controls and increased flows for dilution

Constraints and Concerns

- Fish entrainment reduced but still high
- The best available screening technology and real-time monitoring may not be as effective as necessary in avoiding entrainment effects at diversion locations
- Some Delta islands remain vulnerable to flooding
- Uncertain level of improvement in water quality

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Overview

This alternative emphasizes new storage and operational changes of the water system, increasing the availability, reliability, and quality of water supplies. Physical modifications within the Delta include habitat improvements, new water storage for environmental uses, levee and channel improvements for flood control, and flow barriers to improve water stages and flow circulation.

This alternative provides additional surface storage in the Delta as well as upstream and downstream. A variety of moderate demand management actions including water conservation and land retirement reduce the need for Delta water. Expanded groundwater storage and conjunctive use programs in the Sacramento and San Joaquin River basins maximize the ability to make operational changes in other portions of the system. High surface flows during the early winter months are stored in the ground for later use during summer months or during drought periods. This allows increased flexibility in using the stored water in conjunction with stored surface water to improve the quantity and quality of water available.

*primarily new
storage and
operational
changes*

With water available from new storage and from the expanded groundwater and conjunctive use programs, the operations of existing upstream and downstream surface reservoirs, conveyances, and diversion systems can be modified for more efficient water management. Generally, releases from reservoirs could be modified to increase summer and fall flows through the Delta while addressing localized water quality problems such as south Delta salinity. The timing of Delta and export diversions would also be managed more precisely during seasonal and localized poor water quality conditions. In addition, acquisition of water from willing sellers on the San Joaquin system will increase the amount available for Delta environmental uses. Improving water quality and supply by focusing on new storage and operational modifications to the storage, conveyance, and diversion system requires development of real time flow monitoring and management of the system.

*modify existing
operations*

Habitat in the Delta and around Suisun Bay will be restored and fish screens will be installed on high and moderate priority diversions. These actions will improve fish production and survival. A moderate level of levee and channel improvement in the Delta will significantly reduce the risk of system failure.

A strong emphasis is placed on controlling water pollutant sources and using the operational changes to better manage the flow of pollutants to the Delta. These actions include implementing source control regulations for agricultural drainage and retiring lands with drainage problems. Treatment controls may include storage and treatment facilities for better management of mine drainage sources. In addition, increased flows, better management of the timing of flows, and providing barriers to better direct these flows will improve water quality.

*water quality is
prime benefit*

In summary, this alternative achieves water quality benefits by integrating actions related to water supply and ecosystem quality with those that improve flow conditions for all uses while providing a significant degree of improvement Delta levees and channels.

*benefits in four
objective areas*

Physical and Structural Features

Habitat Restoration

Activities	Benefits
<ul style="list-style-type: none"> Restore riparian, shaded riverine, and shallow water habitat along the Sacramento River channel between Sacramento and Collinsville 	<ul style="list-style-type: none"> Provides substantial improvement in aquatic habitat as well as improvements in water supply reliability and water quality Increases survival and spawning success of anadromous and Delta native fish
<ul style="list-style-type: none"> Restore Delta and floodway corridor shallow water, riparian, terrestrial, and tidal wetland habitat 	<ul style="list-style-type: none"> Provides spawning areas for Delta native fish and forage areas and escape cover for juvenile salmon, Delta smelt, splittail, and other species. Provides improvements in water supply reliability and water quality
<ul style="list-style-type: none"> Restore approximately 75 to 125 miles of shallow water, riverine, and riparian habitat along Delta levees 	<ul style="list-style-type: none"> Provides spawning areas for Delta native fish and forage areas and escape cover for juvenile salmon, Delta smelt, splittail, and other species. Provides improvements in water supply reliability and water quality
<ul style="list-style-type: none"> Restore and protect channel islands from erosion and enhance habitat 	<ul style="list-style-type: none"> Provides habitat for aquatic and terrestrial plant and animal species Improves water quality
<ul style="list-style-type: none"> Restore about 1,500 to 2,500 acres of tidal wetlands in Suisun Bay 	<ul style="list-style-type: none"> Provides wet year spawning habitat for Delta smelt, rearing areas for salmon, and wildlife habitat (e.g. canvasback and redhead ducks)
<ul style="list-style-type: none"> Restore riverine channel features in the San Joaquin River above the Delta to lower water temperature and to protect young fish from predation and straying 	<ul style="list-style-type: none"> Improves fish survival

Considerations

- **Sacramento River Channels** – Feasible and cost-effective habitat restoration implemented between Sacramento and Collinsville.
- **Delta** – Candidate areas for shallow water habitat restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. Candidates for Delta levee habitat restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River.
- **Floodway Corridors** – Habitat restoration must not impair capacity of floodways.
- **Suisun Bay** – Convert diked wetlands or create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait.
- **San Joaquin River** – Confine wide, shallow channels and isolate in-channel gravel quarry areas. May not be self-sustaining.

Water Transport

Activities	Benefits
<ul style="list-style-type: none"> • Construct tide gates and/or flow barriers in southern Delta 	<ul style="list-style-type: none"> • Better manage flow circulation • Increase water stages for south Delta diverters
Considerations	
<ul style="list-style-type: none"> • Operation coordinated with in-Delta and anadromous fishery needs through real time monitoring. • Potential benefits of barriers need to be verified. 	

Water Storage

Activities	Benefits
<ul style="list-style-type: none"> • Develop about 100,000 AF of new water storage in the Delta dedicated to environmental uses 	<ul style="list-style-type: none"> • Provides additional diversion flexibility • Reduces entrainment of fish • Reduces frequency and duration of export curtailments, thus improving water supply reliability • Improves fish transport through the Delta • Could significantly improve response time (compared to Folsom and Shasta reservoirs) for releasing water for improved management of X2
<ul style="list-style-type: none"> • Increase capacity of selected upstream reservoirs or build additional reservoirs with approximately 0.5 to 1 million AF capacity 	<ul style="list-style-type: none"> • Provides additional storage and operational flexibility for supply, water quality, and the environment
<ul style="list-style-type: none"> • Increase capacity of selected downstream reservoirs or build additional reservoirs with approximately 0.5 to 1 million AF capacity 	<ul style="list-style-type: none"> • Provides additional storage and operational flexibility for supply, water quality, and the environment

Considerations

- Locate new environmentally dedicated in-Delta storage reservoir near export pumps on one or more islands such as Bacon, Mandeville, or Victoria.
- Divert water during November, December, and January; release water from March to July as needed. With real-time monitoring, divert when species of concern are not present and divert when species of concern are not present and release water to move fish or release for diversion.
- Environmentally dedicated water storage in the Delta allows reduction in diversions during critical periods.
- Creation of a wide riparian and shallow water habitat corridor around the perimeter of Delta island storage would provide additional fish and wildlife benefits.

Fish Protection and Transport

Activities	Benefits
<ul style="list-style-type: none"> • Construct a San Joaquin River bypass at the head of Old River 	<ul style="list-style-type: none"> • Encourages outmigrating fish to stay in San Joaquin River • Allows for managing flows down Old River
<ul style="list-style-type: none"> • Install fish screens on moderate and high priority diversions in the Delta, rivers, and tributaries 	<ul style="list-style-type: none"> • Reduces entrainment of fish
<ul style="list-style-type: none"> • Construct new screened State Water Project intake at Italian Slough 	<ul style="list-style-type: none"> • Avoids fish predation and entrainment in Clifton Court Forebay when diversion rates are low
<ul style="list-style-type: none"> • Improve drainage in floodway corridors 	<ul style="list-style-type: none"> • Reduces fish stranding
Considerations	
<ul style="list-style-type: none"> • Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility. 	

Flood Protection and Levee Stabilization

Activities	Benefits
<ul style="list-style-type: none"> • Provide a moderate level of protection and stabilization of Delta levees through levee maintenance and stabilization actions 	<ul style="list-style-type: none"> • Manages vulnerability of Delta land use and infrastructure • Manages vulnerability of Delta water supply to salinity intrusion • Manages vulnerability of Delta ecosystem functions • Provides opportunities for habitat restoration
<ul style="list-style-type: none"> • Increase floodway capacities by widening channels, building setback levees, expanding existing floodways and/or new floodways 	<ul style="list-style-type: none"> • Reduce reservoir flood reserve capacity requirement and make storage available for other uses • Improves water quality
<ul style="list-style-type: none"> • Improve flood conveyance capacity of Delta channels through channel maintenance and improvements 	<ul style="list-style-type: none"> • Manages vulnerability of Delta functions • Improves flood conveyance • Provides opportunities for habitat restoration

Considerations

- Provide flood protection equivalent to Army Corps of Engineers PL 99 standard for these islands:
 - All critical western islands such as Jersey Island.
 - Islands with important regional infrastructure (e.g., Highway 12) such as Terminous Island
 - Islands with both valuable habitat and important regional infrastructure (e.g., transmission lines) such as Lower Roberts Island.
- Upgrade all other Delta levees to meet at least the Hazard Mitigation Plan (HMP) standards.
- Integrate protection and stabilization of levees with Delta habitat restoration activities.
- Provide stable funding mechanism for ongoing levee and habitat monitoring, maintenance, and management.
- Improvements to channels include dredging for sediment removal in channels with restricted flood capacity.
- Evaluate combination of floodway capacity and reservoir flood reservation.

Operational and Management Features**Water Diversion Management**

Activities	Benefits
<ul style="list-style-type: none"> • Acquire about 100,000 AF of water from willing sellers in the San Joaquin basin 	<ul style="list-style-type: none"> • Transports fish through San Joaquin River and Delta • Improves water quality • Improves management flexibility for diversions to reduce fish loss
<ul style="list-style-type: none"> • Improve CVP and SWP operations through predation control, coordinating operations, and improving fish salvaging and handling 	<ul style="list-style-type: none"> • Reduces fish losses
<ul style="list-style-type: none"> • Improve real-time monitoring of locations of fish species of special concern and modify water diversions to avoid fish entrainment 	<ul style="list-style-type: none"> • Provides an additional tool to help reduce entrainment of special-concern species • Improves flexibility to divert water during critical fish migration periods
<ul style="list-style-type: none"> • Evaluate, improve, and install behavioral barriers for anadromous fish 	<ul style="list-style-type: none"> • Diverts anadromous fish from areas of potential entrainment and predation • Allows for continued water diversions at current locations
Considerations	
<ul style="list-style-type: none"> • Can use San Joaquin environmental water for pulse flows for fish transport or diluting poor quality flows • Coordinate use of San Joaquin environmental water with the operation of new Delta storage to improve timing of diversions • Evaluate continued use of an acoustic barrier at the mouth of Georgiana Slough. • Evaluate behavioral barriers for Delta Cross Channel and Threemile Slough. 	

Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> Expand groundwater storage and conjunctive use programs to provide 500-800 AF of annual supply 	<ul style="list-style-type: none"> Provides flexibility needed to respond to operational requirements for changing timing of diversions
<ul style="list-style-type: none"> Modify timing of reservoir releases 	<ul style="list-style-type: none"> Improves Delta water quality through dilution and salinity repulsion and improved instream aquatic habitat benefits Improves water supply reliability
<ul style="list-style-type: none"> Expand water conservation best management practices (BMPs) and implement and expand efficient water management practices (EWMPs) 	<ul style="list-style-type: none"> Reduces demand for water from the Delta
<ul style="list-style-type: none"> Implement feasible reclamation and reuse projects for urban and agricultural supplies 	<ul style="list-style-type: none"> Reduces demand from Delta
<ul style="list-style-type: none"> Acquire supplemental water from willing sellers 	<ul style="list-style-type: none"> Provides additional water for water quality, ecosystem, and water users
<ul style="list-style-type: none"> Integrate land retirement and land fallowing programs with existing programs such as CVPIA and San Joaquin drainage program 	<ul style="list-style-type: none"> Reduces demand for water from the Delta Improves water quality Increases flexibility of water supply
Considerations	
<ul style="list-style-type: none"> Reevaluate reservoir operations, flow control reserve capacity requirements and other operational constraints, and develop more flexible operating criteria. Utilize additional storage as a source of releases for water quality, fisheries, habitat and water supply reliability. Use real time monitoring for reservoir releases to improve water quality and ecosystem flow management Coordinate reservoir releases with groundwater storage releases Possible state and federal cosponsorship for conservation and reclamation programs. 	

Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> Mark salmon produced in hatcheries 	<ul style="list-style-type: none"> Facilitates selective catch of hatchery salmon by commercial and recreational fisheries
<ul style="list-style-type: none"> Conduct net-pen rearing of striped bass to supplant natural production 	<ul style="list-style-type: none"> Maintains recreational fishery Reduces operational constraints on water diversions
Considerations	
<ul style="list-style-type: none"> Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks. Need to assess impact of incidental mortality on native (unmarked) fish. 	

Water Quality Management

Activities	Benefits
<ul style="list-style-type: none"> Control agricultural, urban, and industrial discharges through retention and timed release 	<ul style="list-style-type: none"> Improves Delta water quality
<ul style="list-style-type: none"> Modify timing of diversions 	<ul style="list-style-type: none"> Improves Delta water quality by increasing selected Delta channel flows during poor water quality conditions
<ul style="list-style-type: none"> Increase enforcement of source control regulations for agricultural drainage and implement farming best management practices for water quality 	<ul style="list-style-type: none"> Improves Delta water quality
<ul style="list-style-type: none"> Increase enforcement of source control regulations for urban and industrial runoff and implement best management practices for water quality 	<ul style="list-style-type: none"> Improves Delta water quality
<ul style="list-style-type: none"> Integrate existing land retirement and fallowing programs for agricultural lands with drainage problems 	<ul style="list-style-type: none"> Improves Delta water quality Provides potential land for habitat benefit
<ul style="list-style-type: none"> Integrate existing and support appropriate on-site mine drainage remediation measures to the maximum extent feasible 	<ul style="list-style-type: none"> Improves Delta water quality
Considerations	
<ul style="list-style-type: none"> Diversion rates could be increased when and where flows are not needed for water quality improvements, such as during surplus flow conditions in wet winters. Need for retention depends on quality of discharges. Retention discharges through cost-effective actions such as constructed wetlands, underground pipe storage, temporary storage ponds, or reuse. Time agricultural and industrial releases to coincide with higher instream flows or exporting agricultural drainage. Identify priority pollutant sources such as Iron Mountain Mine and west-side San Joaquin agricultural lands. Provide regulatory and institutional incentives for implementation of remediation measures. 	

Institutional and Policy Features

Habitat Programs

Activities	Benefits
<ul style="list-style-type: none"> Integrate recommended habitat restoration actions from other programs, including the Anadromous Fish Restoration Program 	<ul style="list-style-type: none"> Provides additional habitat restoration
<ul style="list-style-type: none"> Establish programs to preserve agricultural land uses that provide valuable habitat functions 	<ul style="list-style-type: none"> Protects existing habitats

Activities	Benefits
<ul style="list-style-type: none"> Establish a CALFED team to coordinate and expedite habitat restoration permits 	<ul style="list-style-type: none"> Accelerates acquiring permits for environmental restoration projects and other CALFED projects
<ul style="list-style-type: none"> Establish and fund a management program and rapid response team to manage introduced species 	<ul style="list-style-type: none"> Protects existing valuable species and habitat
<ul style="list-style-type: none"> Establish a program to identify and use clean dredge materials from the Delta for habitat restoration and levee maintenance in the Delta 	<ul style="list-style-type: none"> Provides materials for habitat and levee improvements
<ul style="list-style-type: none"> Encourage farmers and levee maintenance districts to leave habitat areas undisturbed by working with resource agencies 	<ul style="list-style-type: none"> Protects existing habitats Increases flexibility in maintenance programs
Considerations	
<ul style="list-style-type: none"> Coordinate activities to avoid duplication. 	

Water Quality Standards

Activities	Benefits
<ul style="list-style-type: none"> Reevaluate Delta export/inflow ratios during triennial reviews as habitat effectiveness is realized 	<ul style="list-style-type: none"> Allows for higher level of water transfer as fishery populations improve
Considerations	
<ul style="list-style-type: none"> Monitor to verify effectiveness of habitat and entrainment reduction programs. Develop an adaptive management program to modify habitat restoration and export/inflow ratios in response to improved sustainability of important species. 	

Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> Establish and fund an emergency levee management plan to respond to levee failures 	<ul style="list-style-type: none"> Provides resources to protect Delta functions through proactive and preventative measures
<ul style="list-style-type: none"> Establish landside buffer zones adjacent to levees on islands with deep peat soils 	<ul style="list-style-type: none"> Provides increase in stability of Delta levees and reliability of Delta functions by reducing subsidence adjacent to levees Could be used to provide habitat benefit
Considerations	
<ul style="list-style-type: none"> Determine extent and cost effectiveness of levee management programs and buffer zones. Buffer strip approximately 100 to 150 yards wide dedicated to shallow wetlands. 	

Preliminary Assessment

Benefits

- Improves ecosystem quality through habitat restoration and increased flows
- Improves Delta water quality through pollutant source controls and increased flows for dilution
- Funded levee management program decreases vulnerability of Delta functions
- Increases water availability for all users of Delta water

Constraints and Concerns

- Fish entrainment reduced but still high
- Some Delta islands remain vulnerable to flooding
- Uncertain level of improvement in water quality
- The best available screening technology and real-time monitoring may not be as effective as necessary in avoiding entrainment effects at diversion locations